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CC: Tom

State of Utah
JON M. HUNTSMAN, JR.
Governor

GARY HERBERT
Lieutenant Governor

Department of
Environmental Quality

Richard W. Sprott
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

November 17, 2008

Ms. Christy Woodward, P.E.
Environmental Coordinator
Denison Mines (USA) Corp.
1050 17th Street, Suite 950
Denver, CO 80265

Dear Ms. Woodward:

Subject: Ground Water Discharge Permit-By-Rule for Phase 2 Tony M Mine Evaporation Pond

The Division of Water Quality (DWQ) has reviewed the subject Ground Water Discharge Permit-By-Rule request provided in submittals received on October 13, 2008 and November 3, 2008 including a report titled *Geology and Hydrogeology of the Tony M Mine Project Area, Garfield County, Utah.* Under UAC R317-6-6.2.A.25 of the Administrative Rules for Ground Water Quality Protection, facilities may be granted permit-by-rule if the Executive Secretary determines after a review of the application that the facility will have a *de minimis* (negligible) actual or potential effect on ground water quality. UAC R317-6-6.2.B stipulates that no facility permitted by rule under R317-6-6.2.A may cause ground water to exceed ground water quality standards or the applicable class TDS limits in R317-6-3.1 to R317-6-3.7. If the background concentration for affected ground water exceeds the ground water quality standard, the facility may not cause an increase over background.

Site Hydrogeology

The site hydrogeology for the proposed Phase 2 evaporation pond is very similar to the Phase 1 pond with one notable difference. Unlike the Phase 1 pond, which was partially underlain by the Brushy Basin Member of the Morrison Formation, the entire footprint of the proposed Phase 2 evaporation pond is underlain by the Brushy Basin Member. The Brushy Basin Member is composed primarily of bentonitic mudstone, which acts as a particularly effective natural barrier to downward migration of impounded waters. The Brushy Basin Member is underlain by the Salt Wash Member, which consists primarily of sandstone interbedded with mudstone and siltstone units of varying thicknesses. The Salt Wash Member is the sandstone ore body being mined and is also the shallow aquifer from which ground water is being extracted and impounded in the existing Phase 1 evaporation pond. The ground water quality in the Salt Wash Member is Class III Limited Use Ground Water with an average total dissolved solids concentration of 3,610 mg/l and elevated concentrations of uranium, gross alpha, and radium above ground water quality standards. The proposed Phase 2 evaporation pond will contain ground water extracted from the mine workings of the Salt Wash Member. Therefore, any seepage through the pond clay liner and underlying Brushy Basin and Salt Wash Member mudstones will have a *de minimis* effect on the water quality of the Salt Wash Member from which it was extracted. Therefore, the proposed Phase 2 evaporation pond meets the requirements for ground water discharge permit-by-rule. Below is a summary of the technical justification for ground water discharge permit-by-rule for the Phase 2 evaporation pond.

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- The entire footprint of the proposed Phase 2 evaporation pond is underlain by the Brushy Basin Member of the Morrison Formation, a bentonitic mudstone that acts as a particularly effective natural barrier to downward migration of impounded waters.
- Boring logs in the proposed Phase 2 evaporation pond area indicate mudstone thicknesses ranging from 3 to 37 feet, with an average thickness of 19.5 feet.
- Falling head test results of two soil samples derived from site mudstone yielded hydraulic conductivity values of 1.6×10^{-9} and 9.8×10^{-9} cm/sec (compacted to 95% and 90% respectively, of maximum dry density at optimum moisture content), which is very suitable clay liner material.
- Any seepage of impounded ground water from the Salt Wash Member that may flow through the engineered clay liner and Brushy Basin Member will be a *de minimis* discharge because it will return to the Salt Wash Member where it originated.
- The beneficial uses of the pristine quality Entrada and Navajo Sandstone aquifers are naturally protected by thick low-permeability aquitards.
- The Entrada Sandstone aquifer is separated from the Salt Wash Member by the 180-foot thick Summerville Formation, which consists of alternating beds of marine sandstone, mudstone, siltstone and shale.
- The Navajo Sandstone aquifer is protected by the overlying Carmel Formation, which is a heterogeneous unit composed of interbedded sandstone, mudstone, limestone, dolomite, and gypsum.
- In addition to the overlying aquitard of the Carmel Formation, the confined Navajo aquifer is protected by the strong upward gradient indicated by hundreds of feet of hydraulic head measured in nearby wells.

Construction Permit Required

Ground water discharge permit-by-rule is hereby granted under the condition that a Construction Permit is obtained from DWQ prior to any construction activities for the proposed Phase 2 evaporation pond. Please initiate the Construction Permit process by submitting engineering design plans and specifications to DWQ that have been prepared by a professional engineer licensed in the State of Utah. An independent third party construction quality assurance and quality control (CQA/QC) contractor will be required to certify the pond construction and a CQA/QC certification report must be submitted for review and approval by DWQ. If you have any questions about the Construction Permit, please contact Woodrow Campbell at wwcampbell@utah.gov or (801) 538-6067.

If you have any questions about this letter, please contact Dan Hall at dhall@utah.gov or (801) 538-9153.

Sincerely,

Utah Water Quality Board

Walter L. Baker, P.E.
Executive Secretary

Cc: Paul Baker, DOGM

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